

## MIRAI MR01-K01 Primary Production

Last Modified: 2013-08-23

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Cruise ID: [MR01-K01](#)

Primary Production: Processed (DMO)-QCed

Data Policy: [JAMSTEC](#)

Observation Items: POC

Science Keywords:

BIOSPHERE > AQUATIC ECOSYSTEMS > PLANKTON > PHYTOPLANKTON  
BIOSPHERE > ECOLOGICAL DYNAMICS > ECOSYSTEM FUNCTIONS > PRIMARY PRODUCTION  
BIOSPHERE > ECOLOGICAL DYNAMICS > ECOSYSTEM FUNCTIONS > PHOTOSYNTHESIS

Cruise Report

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/MR01-K01\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR01-K01_all.pdf)

### For Using Data

#### Principal Investigator

Takeshi Kawano (JAMSTEC)

#### Use Constraints

See [Terms and Conditions](#) about constrain of use.

#### Data Citation

See [Terms and Conditions](#) about data citation.

### Instrument

Instrument:

CN mass spectrometer



### Overview

Primary Production Data during MR01-K01 cruise were obtained by the following methods :

- Photosynthesis and irradiation curve method during underway (PI\_underway) Water sampling, incubation, and devices and tracers for analysis for each method are outlined below.

For further information, please see Cruise Report.

#### Outline of water sampling, incubation, and analysis

Photosynthesis and irradiation curve underway (PI\_underway) [Outline figure](#)

- 1) Surface sampling : Sea surface water is continuously pumped up at 4.5 meters depth to the sea surface monitoring laboratory and then flowed into each analysis device through a steel pipe and a vinyl-chloride pipe.
- 2) Sampling layer : 1
- 3) Tracer :  $\text{NaH}^{13}\text{CO}_3$
- 4) Incubation period : 3hours
- 5) Filtration : Whatman GF/F filter was used at dark place.
- 6) Preservation : Filters were kept to freeze at -20degC and dried in the oven at 45degC.
- 7) Preservation period of frozen filter paper : within 45 days
- 8) Analysis place : MIRAI
- 9) Analysis device : CN mass spectrometer (see section 3 and 4 for detail)
- 10) Analysis method: Dumas method, Mass spectrometry

#### About CN mass spectrometer

CN mass spectrometer system equipped with R/V Mirai can measure stable isotope ratios of  $^{13}\text{C}$  and  $^{15}\text{N}$  comprised in liquid, solid, and gas states of biological or biogenic samples, simultaneously and continuously. This system consists of two devices, preprocessing equipment "ROBOPLEP-SL" and stable isotope ratio mass spectrometer "EUROPA20-20".

##### (1) ROBOPLEP-SL

A tin capsule containing the sample falls into the combustion tube and is converted in the presence of oxygen to  $\text{CO}_2$ ,  $\text{N}_2$ ,  $\text{NO}_x$  and  $\text{H}_2\text{O}$ .

An elemental copper stage reduces  $\text{NO}_x$ , a  $\text{MgClO}_4$  trap removes water vapour,

a switchable Carbosorb trap can be used to remove  $\text{CO}_2$  (for  $^{15}\text{N}$  only analyses) and a GC column separates  $\text{CO}_2$  from  $\text{N}_2$  (allowing dual isotope analysis).

And then, it is introduced into the "EUROPA20-20".

##### (2) EUROPA20-20

$\text{CO}_2$  and  $\text{N}_2$  are collided with thermion and ionized in the high vacuum ion source.

When the generated ions are accelerated by constant voltage and pass through the analysis tube, differences in mass (m) and electric charge (z) of isotope ions make the different orbits by the magnetic field in the analysis tube.

Thus, isotopes can be separated by the displacement of the orbits.

These signals are converted into the frequency at the detector, and transmitted to control PC. Blank and drift corrections are conducted on the control software.

see flow diagram. MR01-K01\_pp\_ANCA-SL [PDF file](#)

#### Specifications of CN mass spectrometer

##### (1) ROBOPLEP-SL

Manufacturer : SerCon Ltd. (former PDZ Europa Ltd.)

Instruments : ANCA-SL ROBOPREP-SL

S/N : 17001-051

Sample Range Solids/Liquids : 10 to 1000 µgN, 10 to 1000 µgC.

Autosampler : 60 position pneumatic autosampler that takes (standard) capsules with up to 47mm in diameter.

##### (2) EUROPA 20-20

Manufacturer : SerCon Ltd. (former PDZ Europa Ltd.)

Instruments : ANCA-SL EUROPA 20-20

S/N : 9007-075

Analyzer and Analysis tube : 120° extended geometry with an 11 cm radius magnetic sector

Resolution :  $m/\Delta m=95$  ( $N_2$ ) 10% valley definition

Sensitivity : Inside Vacuum level is  $4 \times 10^{-6}$  mbar in an atmosphere of helium

20 nmol  $CO_2$

15 nmol  $N_2$

Abundance Sensitivity : Inside Vacuum level is  $4 \times 10^{-6}$  mbar in an atmosphere of helium

30 ppm for  $CO_2$  at  $4 \times 10^{-6}$  mbar in continuous flow mode.

5 ppm for  $N_2$  at  $4 \times 10^{-6}$  mbar in continuous flow mode.

##### (3) Precision

All specifications are for  $n=5$  samples.

It is a natural amount and five time standard deviation of the analysis as for amount 100 µg of the sample.

$^{13}C$  (0.2 ‰)

$^{15}N$  (0.5 ‰)

##### (4) Data processing

Device control and processing soft : ANCA ver.3.5 (former PDZ Europa Ltd.)

Fully compatible with Windows 3.1 or Windows 95.

##### (5) Reference material

The third-order reference materials whose data values were decided by the second reference materials

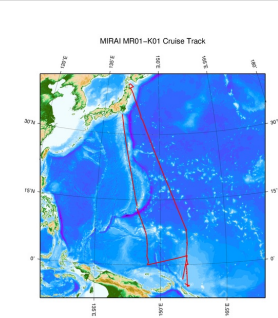
(IAEA-N-1, IAEA-N-2, and IAEA-CH-6) dealt in International Atomic Energy Agency (IAEA) were used.

#### Note

In this cruise, there is an observation log sheet at the time of the data acquisitions.

If necessary, please contact us from "Contact Us" above.

#### Related Information



[Enlarge Image](#)

#### MR01-K01

Ship Name: MIRAI

Period: 2001-02-14 - 2001-03-22

Chief Scientist: Kentaro Ando (JAMSTEC)

Project Name: [Tropical Ocean Climate Study (TOCS)]

#### Update History

2013-08-23	An observation data was registerd.
2012-12-25	An observation data was registerd.

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Cruise ID:

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Dive ID:

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## MIRAI MR01-K01 Primary Production

Last Modified: 2013-08-23

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Cruise ID: **MR01-K01**

Primary Production: Processed (DMO)-QCed

Data Policy: **JAMSTEC**

### PPD Plu (MR01-K01)

Format information describes column no., column heading mnemonic and comments of PI underway data sheet in MR01-K01.

PI : Photosynthesis and irradiation curve

Missing value is presented by -999.

Column No.	Column Heading Mnemonic	Comments
1	CruiseNO	CruiseID
2	Inc.Type	Incubation method (PI : Photosynthesis and irradiation curve)
3	UTC Date	Sampling start UTC date (refer to Thermosalinograph)
4	UTC Time	Sampling start UTC time (refer to Thermosalinograph)
5	LST Date	Sampling start LST date (LST : Local Ship Time, refer to Thermosalinograph)
6	LST Time	Sampling start LST time (LST : Local Ship Time, refer to Thermosalinograph)
7	Latitude	Sampling start position Latitude degree (refer to Thermosalinograph)
8	Longitude	Sampling start position Longitude degree (refer to Thermosalinograph)
9	Sampling depth	Sampling depth (m)
10	Chlorophyll	Chlorophyll a. quantity (µgC/L)
11	Light intensity	Light intensity (µeinstein/m2/sec)
12	Inc.Time	Incubation Time (hour)
13	POC	POC (µg)
14	13C	Ratio of 13C (atom%)
15	P.P.	delta POC (µgC/L/H)
16	Pb	P.P./Chlorophyll a. (µgC/L/H/µg chl.a.)
17	Flag	Flag of sample (for explanation see Quality flags)
18	Remarks	Flag explanation etc.

about 5)

The same day is generated in LST in the vicinity of the date line on the second.

about 15)

The equation to be used in the calculations.

$P.P.=1.025 \times POC \times (13C-1.084) / \{ (2000 \times 0.01084 + 200) / (2000 + 200) \times 100 - 1.084 \} / 3$

1.025 : <sup>13</sup>C Stable Isotope discrimination factor

1.084 : <sup>13</sup>C ratio of zero time blank POC

$(2000 \times 0.01084 + 200) / (2000 + 200) \times 100$  : Amount of <sup>13</sup>C in which 10% of Total dissolved inorganic carbon in seawater was added as tracer.

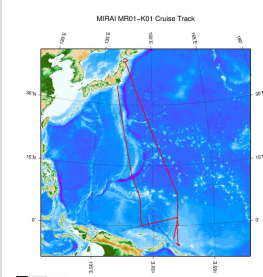
about 16)

$Pb = P.P. / \text{Chlorophyll a.}$

Literature cited for the equation

Meteorological Agency. 1990. Manuals for oceanographic observation. Japan Weather Association. 253-256pp.

### Related Information



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Chief Scientist: Kentaro Ando (JAMSTEC)

Project Name: [Tropical Ocean Climate Study (TOCS)]

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Dive ID:

SAMPLER (SHELL)  
POWER GRAB  
SAMPLER (CLOW)  
BMS

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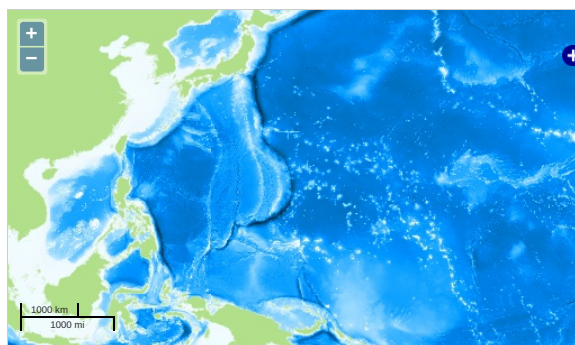
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### Observation Map



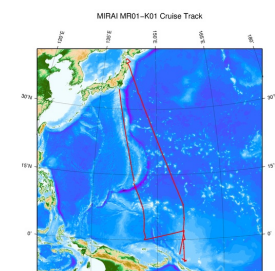
... Observation Line ... Navigation ... Observation, Dive Point, Hole

### Data List

File names

☐ MR01-K01\_pp\_Plu.csv

### Related Information



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